X

PROGRESS REPORT

OF

THE FOREST SURVEY BRANCH

FOR

1886-87.

BY

W. H. REYNOLDS, Esq., F.R.G.S.,
SUPERINTENDENT OF FOREST SURVEYS.

WITH REMARKS BY THE SURVEYOR GENERAL,

AND

WITH THE ORDERS OF THE GOVERNMENT OF INDIA.

CALCUTTA:
PRINTED BY THE SUPERINTENDENT OF GOVERNMENT PRINTING, INDIA.
1888.

No. 637F., dated Simla, the 18th June 1888.

From—Sir E C. BUCK, Secretary to the Government of India, Revenue and Agricultural Department.

To—The Surveyor-General of India.

I AM directed to acknowledge the receipt of your letters No. 335-S, dated 7th February, and No. 760-S., dated 27th March last, submitting the Progress Report of the Forest Survey Branch for the season 1886-87, with an additional table showing the areas topographically surveyed.

2. Your letter of 7th February epitomizes the information contained in the Report so clearly and concisely, that it only remains for the Government of India to express its satisfaction with the progress reported, and with the economical rates at which the work has been effected. His Excellency the Governor General in Council, agrees that credit is due to the Superintendent of Forest Surveys for the continued successful results of the work of the Branch, and directs that the thanks of the Government of India may be conveyed to Mr Reynolds.

No. 638F.

COPY forwarded to the Inspector-General of Forests, for information.

G. C. Press, Simla.—No. 197 R. & A. D.—22 6 88.—260.

No. 760 S., dated Calcutta, the 27th March 1888.

From—COLONEL H. R. THUILLIER, R.E., *Surveyor General of India,*

To—*The Secretary to the Government of India.*

WITH reference to my letter No. 335 S., dated the 7th ultimo, submitting the Annual Progress Report of the Forest Survey Branch for 1886-87, I have the honour to forward herewith copy of letter No. 79, dated the 22nd instant, from the Superintendent of Forest Surveys, giving further information regarding the areas of demarcated State forests and of undemarcated State forests and village lands.

No. 79, dated Dehra Dún, the 22nd March 1888.

From—W. H. REYNOLDS, Esq., *Superintendent of Forest Surveys,*

To—*The Surveyor General of India.*

IN reply to your letter No. 327, dated 7th ultimo, I have the honour to invite your attention to paragraph 10 of my Annual Report for 1886-87, and to point out that, with the exception of Bashahr, I have already given (as far as it is possible to do so) the figures required by the Government of India in their review of my Annual Report for the previous year, showing the classes of areas surveyed by the Forest Survey Branch.

2. I have now, however, tabulated the figures and enclose a statement in which is given the areas of (*a*) demarcated State forests, and (*b*) of undemarcated State forests and village lands. In this statement I have also added the figures for Bashahr, which it was not possible to give when the Annual Report was written, for reasons already assigned in the Report.

3. In Berar, a great proportion of the area given under head (*b*) is State forest, but unclassed; and as cultivation is not prohibited in these tracts and as the land-revenue assessments for the most part are based upon the number of ploughs in use, it has not been considered necessary in a great part of the Melghat to separately demarcate the forest areas from village lands, and hence I have included the undemarcated State forests and village lands under the same head in the enclosed statement.

4. In Bashahr the whole of the forest areas in the Native State, whether demarcated or *undemarcated*, are held on lease by our Government, and are under the charge of the Punjab Forest Department. For forest conservancy purposes only the very best of forests have been demarcated, but these demarcations, it must not be supposed, limit the extent of the Government forest property, nor are they, strictly speaking, "outer forest boundaries," but are simply marks erected for the better management of the forests. As the village lands in Bashahr are not demarcated, I regret that I am unable to separate these areas from the areas of the undemarcated forest property, and hence both are given under the same head.

A reference to enclosure No. 3 of my Annual Report for 1886-87 (Forest stock map, sheet No. 346—3 S.E., Punjab), upon which is shewn the forest areas in detail, will give a fair idea of the proportion the actual forest areas in the Upper Sutlej valley bear to village and other lands.

Area topographically surveyed by the Forest Survey Branch during 1886-87.

Province and District.	AREA IN SQUARE MILES.		Total.	REMARKS.
	Demarcated forests.	Undemarcated forests and village lands.		
Oudh—Kheri	205·37	...	205·37	
Berar—Melghat	217·18	252·80*	469·98	
Bengal—Singhbhoom	54·00	...	54·00	
Punjab—Bashahr	63·81	110·19†	174·00	
	540·36	362·99	903·35	

* A great proportion of this area is unclassed State forest.

† All forests in Bashahr, whether demarcated or *undemarcated*, are held on lease by the British Government and are managed by the Punjab Forest Department.

DEHRA DUN;
The 22nd March 1888.

W. H. REYNOLDS,
Superintendent, Forest Surveys.

PROGRESS REPORT OF THE FOREST SURVEY BRANCH FOR 1886-87.

No. 335 S., dated Calcutta, 7th February 1888.

From—COLONEL H. R. THUILLIER, R.E., *Surveyor General of India,*

To—*The Secretary to the Government of India*, REVENUE AND AGRICULTURAL DEPT.

I HAVE the honour to forward the Annual Progress Report of the Forest Survey Branch for the year 1886-87, submitted by Mr. W. H. Reynolds, Superintendent of Forest Surveys, under whom the operations have been carried out.

2. The principal operations were in Berar and in the Punjab (Bashahr), in continuation of those of last year; the boundary survey of the Singhbhum Forests in Bengal was also continued, and new surveys were initiated in the Kumaun Division, North-Western Provinces, and in the Kheri District of Oudh. The instruction in Surveying was carried out in the Dehra Dun Forests; 30 students went through the practical course during the field-season. Drawing classes were held during the School session for the students of the previous year, of whom 34 attended.

3. The outturn of the field and office work is given in Appendices A and B. The area topographically surveyed amounts to 903 square miles, of which 508 square miles have been surveyed on the 4″ scale and 396 square miles on the 2″ scale. The classes of areas surveyed have not been sufficiently distinguished to separate them, and additional information has been called for on this point, which will be submitted subsequently. In addition to the above, 597 linear miles of forest boundaries were surveyed. The triangulation has been extended over an area of 580 square miles, but the Report does not state how much of this area is in advance of the area surveyed in detail.

4. The outturn of topography is considerably in excess of that of former years, the average of the last two years being 510 square miles. This large area is principally due to the fact that the survey in Kheri, which comprises 206 square miles, is only a partial survey, the traverse basis and some of the topographical details having been obtained from the records and maps of the Revenue Survey previously executed; the longer duration of the field operations in the Himalayas also accounts for some increase.

5. The cost of the work in Berar is R67 per square mile for the 4″ survey and R46 per square mile for the 2″: these rates are slightly lower than in the previous year, when they were R69 and 49 respectively. The cost of the Bashahr survey is R47 per square mile, which is extremely low for 4″ work in the Himalayas. This result is apparently obtained by the employment thereon of Native surveyors only, on low salaries; and, with the exception of the very limited time Mr. Reynolds was able to devote to this particular survey, the supervision and check of the sub-surveyors appear also to have been under Native management. It is desirable that in future Reports the nature and extent of the supervision and tests applied to the field-sections should be given for each survey.

These rates include the cost of all the various operations of the survey both in the field and in office. The cost rate for the Kheri survey is not comparable, as the survey was only a partial one.

6. The Expenditure for the year amounts to R75,463, against R54,627 in 1884-85 and R68,358 in 1885-86.

7. The maps submitted with the Report are excellent specimens of hill-drawing, the ground being very effectively represented. The hills being printed in a lighter colour will doubtless be advantageous for Forest purposes, as the addition of Working-Plans on such sheets will be much clearer.

8. The outturn of work during the year under report is very satisfactory, and I consider that Mr. Reynolds, the Superintendent, and his Department are entitled to credit for this successful result.

9. I have to report that I inspected the Office of the Forest Survey at Dehra in April last, and was well satisfied with all I saw there. The final maps are well drawn, and the procedure adopted in their preparation is calculated to ensure accurate copying with economy in time. The records are systematically arranged, and the general organization of the Office excellent.

10. The Trigonometrical Branch Office at Dehra has continued to assist the Forest Department in the publication of their maps.

Annual Progress Report of the Forest Survey Branch of the Forest Department, from 1st October 1886 to 30th September 1887; by W. H. Reynolds, Esq., F.R.G.S., *Superintendent of Forest Surveys: dated 8th December 1887.*

The Season's Field Work.

The operations of the Forest Survey Branch during 1886-87 were, throughout the year, under the charge of Mr. W. H. Reynolds, Superintendent of Forest Surveys. Field work was carried on, as was done during the previous season, in Berar, Bengal, the Punjab, and the North-Western Provinces and Oudh. The new surveys taken in hand during the year were:—(*a*) the Kheri Forests in Oudh; (*b*) the Forests recently acquired from the Kumaun Iron Works Company, in the Central Circle of the North-Western Provinces; and (*c*) the Ninglat and Gogar Forests, also in the Central Circle of the North-Western Provinces. In Berar, field-work was continued in the Bairagarh and Gugumal State Reserves, as well as in the unclassed forests and village areas in the Garga and Sipna valleys of the Melghát Taluk; in Bengal, the boundary surveys of the Singhbhum Forests which were commenced in 1885-86 were continued; and in the Punjab, field operations were carried on in the Bashahr State, as well as in the forest tracts of the British Parganas of Kotguru and Kotkhái. With the exception of the survey of the Bairagarh State Forests, which are being surveyed on the scale of 2″ = 1 mile, the entire Forest Survey work is being executed on the scale of 4″ = 1 mile.

Duration of Field Season.

2. In Berar the field parties were out from the middle of November to 26th June; in the North-Western Provinces and Oudh the plane-table parties were in the field for an average of 5½ months, and completed the work they were employed upon; the duration of the Bashahr field season in the Himalayas was from 1st October to the middle of December 1886, and again from 1st May to 30th September 1887, or an average of about 7½ months.

Berar Melghát party.

3. The Melghát Survey party, whose head-quarters is at Chikalda, and which took the field about the middle of November, was for topographical survey purposes divided into three sections of plane-tablers, each working under a European assistant; the European assistant examined each Native surveyor's work, ran levelled contours, and finally inked in the field sections, and is held responsible for the accuracy of each sub-surveyor's work; portions of the work

were subsequently examined by the Superintendent himself. Section No. 1 was under the charge of Mr. Litchfield, Officiating Deputy Conservator of Forests, and was employed entirely in the State Forests of Bairagarh and Gugumal, the survey of which is being done on the 2″ scale. The 2nd section worked on the 4″ scale, and was under the charge of Mr. Chill; it was employed in the unclassed forests adjoining the Gugumal State Reserves and in the Garga valley. Section No. 3 also worked on the 4″ scale, and completed the survey of the unclassed forests immediately to the north of the Bairagarh State Forests, as well as the village tracts in the Sipna valley; this section was under the charge of Mr. James Marten. There were also in the field traverse and triangulating parties working in the western portions of the Melghát, as well as a computing establishment which remained at Chikalda. The entire work was conducted under the direction and immediate supervision of the Superintendent himself, Mr. Reynolds. The triangulation of the Melghát is now completed, and the party recently employed upon this branch of the work will enter the Central Provinces, to prepare ground in advance in the forests of the Raipur District. Attached to this, and marked No. 1, is an index-map of the Melghát, which exhibits the areas triangulated and traversed during the field season of 1886-87, as well as those topographically surveyed up to date.

Settlement of Berar Provincial Boundary.

4. The Central Provinces and Berar Provincial Boundary, which touches on the area under survey, having been under dispute, the Deputy Commissioners of the adjoining Districts of Betul and Ellichpur were deputed by their respective Governments to finally settle, whilst the survey was in progress, so much of the boundary as marched with the Betul District. Accordingly the work was taken in hand in March, and as the demarcation advanced and was approved, the boundary was at once mapped. Mr. Reynolds accompanied the Deputy Commissioner during the settlement of this important boundary question, for the purpose of giving his professional advice and to aid in having the boundary properly mapped. The Provincial boundary (which is also the Forest boundary for a considerable length), as laid down by Colonel Mackenzie and Mr. Drysdale, Deputy Commissioners of Ellichpur and Betul respectively, was approved by the Central Provinces Administration in letter No. 2400—124, dated 14th May 1887, to the Secretary for Berar, and by the Resident at Hyderabad in his letter No. 1458, dated 6th June 1887, to the Commissioner of the Hyderabad Assigned Districts.

Singhbhum, Bengal.

5. The boundary surveys of the Singhbhum State Forests in Bengal were continued during the year under report. The party was under the charge of Mr. T. S. Marten, and started from Dehra on the 4th November, arriving at Chyebassa on the 17th November; field work was continued until the 19th April, when the party returned to Dehra. All boundaries that had been demarcated prior to the close of the field season have been mapped, but the demarcations of the southern boundaries of the Singhbhum Forests, which also form the District boundary, are still incomplete, and until such time as these boundaries are clearly laid out on the ground it will be impossible to have complete boundary maps of these forests. The question of completing these demarcations has been referred to the Conservator of Forests, Bengal, and he is taking the necessary steps with his Government to have the work pushed on.

Bashahr, Kotguru, and Kotkhái—Punjab.

6. In the last Annual Progress Report it was reported that at the close of the year the Bashahr Survey party was still in the field; this party continued its field work until the middle of December, when, owing to the first heavy fall of snow, it was obliged to close field operations and return to Dehra; it again took

the field on the 1st May 1887, and will be employed upon field operations until again driven out of the Himalayas by the winter snows. The Bashahr party is organized in the same way, and works upon the same lines as the Forest Survey parties working elsewhere, and the supervision is just as strict. The scale of the survey is 4″=1 mile, with levelled contours run at vertical distances of 500 feet and sketched contours at 25 feet intervals. Each party or section of sub-surveyors works under a surveyor of skilled and proved ability. This surveyor does no original topographical work himself, but he tests and revises, if necessary, the work of each surveyor as it progresses, and then lays down himself the levelled contour lines and finally inks in the field sheets. A farther test is also applied to the work by the Superintendent, who, on the occasion of his periodical visits, selects certain areas to be examined by himself. Mr. Reynolds was with the Bashahr party from 17th November to the middle of December 1886, and again from early in May to the beginning of July 1887; he also visited the party towards the close of the survey year in September 1887. The Bashahr party was divided into two sections, one of which completed the survey of the forest areas in the British Parganas of Kotguru and Kotkhái, at heights averaging from 5,000 to 10,000 feet above sea-level, whilst the second section worked on the Sutlej in sheets Nos. 346, 347, and 331 at heights ranging from 5,000 to 15,000 feet above sea-level. A triangulating party was also employed in Bashahr from the 29th October to 7th December 1886, and again in September 1887. The triangulation is well in advance of the topographical work. The tracts topographically surveyed during 1886-87, as well as those triangulated up to date, are shown on the index-map of Bashahr attached hereto and marked No. 2.

Kheri, Oudh.

7. It having been considered desirable to frame a Working-Plan of the Kheri Forests, orders were received early in October to take up the survey of these forests. It was originally intended that these tracts should be used as a training ground, in surveying, for the Forest School students, in the same way as the Kalesar Forests were used the previous season; but subsequently this arrangement was altered, and the students were kept in the Dehra Dun Forests to learn surveying. A small detachment of Native surveyors was deputed to Kheri on the 18th November 1886, and remained in the field until the 30th April 1887, when, on completing the entire work, the men returned to Dehra. The survey of the Kheri Forests was not an entirely original survey, the topographical work was based upon the traversing of the Revenue Survey Department, and some of the details of lesser importance were taken from the Revenue Survey maps. The scales adopted were those upon which the previous surveys had been done—*viz.*, 4″ and 2″=1 mile. Whilst the survey was in progress, Mr. Broun, Officiating Deputy Conservator of Forests, was on the spot collecting data for the Working-Plan of the Kheri Forests, and he, at the same time, supervised the work of the surveyors and instructed them from time to time of the necessary details to be shown on the maps for his Working Plans purposes. The final maps for Working-Plans purposes are being drawn on the 2″ scale.

Kumaun, North-Western Provinces.

8. In the forest tracts recently acquired from the Kumaun Iron Works Company, a small detachment of surveyors was sent to lay down, on the existing 4″ maps, the boundaries which had recently been demarcated, comprising the outer boundaries of the "new Forest Reserves" and the interior boundaries of "Chaks," or lands set apart for the use of village communities. This work was in progress from the 15th January to the setting in of the rains, and was carried on, more or less, under the supervision of the local Forest Officer.

9. Orders having been received in April 1887 to survey the Ninglat and Gogar Forests in the Central Circle of the North-Western Provinces, the ground was triangulated between the 2nd June and 7th July. The plane-tabling was taken up immediately after the rains ceased, and it is still in progress.

Ninglat and Gogar, Central Circle, North-Western Provinces.

Abstract of Field-Work.

10. A summary of the outturn of field work will be found in Appendix A. The total area plane-tabled was 904 square miles, of which 508 square miles were surveyed on the 4″ scale and 396 square miles were done on the 2″ scale. The details are as follows:—

Plane-tabling or detailed survey

On the 4″ scale—

in Kheri, Oudh	27	square miles
in Melghát, Berar	253	,,
in Bashahr, Punjab	174	,,
in Singhbhum, Bengal	54	,,
	508	,,

On the 2″ scale—

in Kheri, Oudh	179	square miles
in Melghát, Berar	217	,,
	396	,,

In addition to the above, 597 linear miles of forest boundaries were also surveyed on the 4″ scale, as well as 50 miles of new forest roads. Of the above areas, those in Kheri and Singhbhum are demarcated Reserved Forests, and of the area surveyed in Berar 217 square miles are demarcated State Reserves, whilst a large proportion of the balance is undemarcated State forest land, unclassed. The Bashahr field sheets are still with the field parties; hence it is not possible, at present, to say, with any certainty, how much of the area surveyed is demarcated forest, but, roughly speaking, it is estimated that one-third of the area is demarcated forests, and the balance is *undemarcated* forests, pasture lands, and cultivated village areas. As the survey advances and the sheets are received in the Office, it will be possible to give the exact figures. The season's plane-tabling compares favourably with the outturn of the detailed surveys of previous years. The figures for the past three years were:—

1882-83	361	square miles.
1884-85	411	,,
1885-86	608	,,

The large area turned out during the year under report—*viz.*, 904 square miles—is due chiefly to the fact that the Kheri work was not an entirely new survey, and it is partly due to the field parties having been kept longer at out-door work than usual, owing to field operations having been extended to the Himalayas, where field work can be carried on during the summer months.

11. The area triangulated during the year was 580 square miles, *viz.*:—

Triangulation

in Gogar and Ninglat Forests	70	square miles
in Melghát, Berar	265	,,
in Bashahr, Punjab	245	,,

One thousand one hundred and fifteen stations were fixed by triangulation, giving an average of nearly 2 points to every square mile of area triangulated.

12. Over an area of 453 square miles, 498 linear miles of traversing were run, giving 6,482 fixed stations.

Traversing

13. In the contoured surveys of Berar and Bashahr 2,399 linear miles of levelled contours were laid down.

Levelled Contours.

14. Three thousand five hundred and thirty-four observations were made with the tangent scale clinometer to determine the heights above sea-level of 1,726 points.

Heights by tangent scale clinometer.

15. The usual forest-growth record was prepared for all forest tracts under survey. A specimen map is attached (marked 3) illustrating the details which are recorded in the Bashahr Survey.

Forest-growth record.

Office Work.

16. Information regarding the outturn of computations will be found in Appendix A. The number of triangles computed in duplicate was 1,678, whereby 692 stations were fixed. The rectangular co-ordinates of 6,306 traverse stations situated on 455 linear miles of traversing were computed in duplicate. The number of triangles worked in duplicate to determine the heights above sea-level of 714 stations was 1,410. The spherical co-ordinates of 89 stations of the Great Trigonometrical Survey were converted into rectangular co-ordinates; and the areas of 389 demarcated fields, &c., were deduced in duplicate. The computations are completed up to date; there are no arrears.

17. An abstract showing the original drawings under preparation during the year will be found in Appendix B. Of the sheets reported as being in progress last year, Nos. XIV, XXIV, XXIX, XLIII, LXXIII, and LXXVIII of Kumaun and Garhwal have been published, and Sheets VIII, IX, and X of the same series have also passed through the Press. Sheets Nos. III, VI, XI, and LXXV are in progress. Kumaun and Garhwal charts of triangulation and traversing, Sheets Nos. I, IV, V, and VIII, on the scale of 1″=1 mile, are in progress, Nos. I and IV are in the Press, and No. II was published during the year. A map on the 1″ scale of the "Nindhaur Hills Working-Circle" has also been published.

Map-drawing, North-Western Provinces and Oudh. Kumaun and Garhwal.

18. For the School Circle of the North-Western Provinces a map of the Dehra Dun Reserved Forests, on the scale of 1″=4 miles, illustrating the Working-Plan, has been published, and a map of the Saharanpur Division is in progress; also a map illustrating the geological formation of the Mussooree-Gangotri route was drawn on the scale 1″=6 miles.

School Circle.

19. Of the Oudh Forests, a map of the Puranpur Reserved Forests, in District Pilibhit, on the scale of 1″=1 mile, has been published, and the drawing of sheets Nos. 113 N.W. and 113 S.W. of the Kheri Reserved Forests, on the scale of 2″=1 mile, is in progress.

Oudh.

20. For the Punjab, a map of the Kalesar Forests, on the 4″ scale, which was in progress last year, has passed through the Press, and a map of the Government Forests in Bashahr State, sheet No. 346 $\frac{S.\ E.}{3}$ (Punjab), also on the 4″ scale, has been published. Punjab Sheet No. 333 $\frac{S.\ W.}{1\ \&\ 2}$, containing the Kotkhái Forests in the Simla District, has been published, sheet No. 333 $\frac{N.\ W.}{1\ \&\ 2}$ is in the Press, and sheet No. 332 $\frac{S\ W}{3}$ containing the Kotgarh Forests is in progress; all these sheets are contoured maps and are on the 4″ scale. A map in two sheets of the Kangra District, showing the Reserved and Protected Forests, on the $\frac{1}{2}$″ scale, is in the hands of the draftsman, and so also is a map, in 7 sheets, of the Chamba Forests. A map on the scale of 4″=1 mile of the Changa Manga Plantation (to illustrate the Working-Plan, 1886) has been published.

Punjab.

21. The drawing of 12 sheets on the 4″ scale of the Singhbhum boundary survey is in progress; of these sheets, Nos. 127 $\frac{N.E.}{2}$, 157 $\frac{S.W.}{3}$, and 158 $\frac{N.W.}{1}$ have been sent to Press. Sheet No. 157 $\frac{S.W.}{4}$ was published during the year.

Bengal-Singhbhum.

22. For Berar the following 4″ contoured maps have been published:—a map containing the villages of Badnapur, Bhopapur, Deogaon, &c. (part of sheet No. 20); map containing the villages of Bhelkhera, Janona, and Raipur (part of sheet No. 20); map containing villages of Borala, Gond-Wagholi, &c. (part of sheet No. 20); and on the 2″ scale the following maps have been published—sheets Nos. 20 S.W., 20 S.E., and 27 N.W. and S.W. The following contoured maps of the Melghát, on the 4″ and 2″ scales are, in progress—

Berar.

Sheet No. 19 $\frac{N.E.}{1}$
19 $\frac{N.W.}{1}$
19 $\frac{N.E.}{3}$
19 $\frac{N.W.}{3}$
20 $\frac{N.W.}{2}$
26 $\frac{N.W.}{1}$
26 $\frac{N.W.}{3}$
26 $\frac{S.W.}{1}$
26 $\frac{S.W.}{3}$
26 $\frac{S.W.}{4}$
} scale 4″ = 1 mile

20 N.E.
20 N.W.
20A N.E.
} scale 2″ = 1 mile

and the following charts of triangulation on the 1″ scale are also in progress—*viz.*, Sheets Nos. 12, 19, 20, 20A, 26, and 27.

23. For various Forest and District Officers, 61 tracings were made, 3,158 printed maps of various kinds were coloured, and 379 printed maps were cut up and mounted in book form.

Tracings and other miscellaneous work.

Expenditure for the year.

24. In Appendix C will be found the amounts expended on field and office work in the North-Western Provinces, Oudh, Bengal, and Punjab surveys, as well as charges for work not connected with these surveys. The cost of the field work in the Kumaun and Garhwal Forests of the Central Circle was ₹1,063, and of the office work ₹1,196. In the Kheri Forests of Oudh an expenditure of ₹834 was incurred on field work. In Bengal, ₹4,040 were expended on field work and ₹1,651 on office work, in connection with the boundary survey of the Singhbhum Forests. In the Punjab, the expenditure on account of field and office work in the Bashahr Survey was ₹8,261, while ₹350 were expended on the Kalesar Survey, the latter chiefly on account of drawing. To the Imperial Survey Department was paid the sum of ₹1,798 for photozincographing original fair sheets and supplying printed maps, &c., to the Forest Survey Branch. The total expenditure of Imperial Funds on field and office work, including all charges, was ₹32,065.

Imperial Expenditure.

25. The expenditure on field and office work of the Berar Survey, as well as other charges of miscellaneous expenditure, will be found in Appendix D. The sum of ₹21,592 was expended on triangulation, traversing, detailed plane-table surveys (on the 4″ and 2″ scales), as well as other field work; while the office work, comprising computation, plotting, drawing, the deduction of

Berar Expenditure

areas, &c., cost R5,335. The sum of R316 was paid to the Imperial Survey Department on account of photozincographing and supplying printed maps to the Forest Survey Branch. The total expenditure in Berar during the Survey year ending 30th September 1887, including all charges, was R43,485.

Cost Rates.

Melghát, Berar.

26. In 1885-86, the cost of the Berar work was :—

	R
4″ surveys	69 per square mile
2″ „	49 „ „

whereas during the year under report the cost of the season's work, estimated on the total area plane-tabled, is—

	R
4″ surveys	67 per square mile
2″ „	46 „ „

thus comparing favourably with the cost rates of the previous year.

The items included in the cost rates for Berar have been detailed in previous Reports, hence there is no need to repeat them again. To last year's Report was attached a specimen sheet of the Berar 4″ work; to the present Report is added, and marked 4, a specimen sheet of the 2″ Berar work.

Singhbhum, Bengal.

27. The boundary surveys of the Singhbhum Forests cost, including traversing, computation, detailed survey on 4″ scale of a strip of country, 10 chains wide along all boundary lines, and the drawing of fair sheets for the press, R13 per linear mile. The cost of the previous season's work was R11; the difference in cost is accounted for chiefly as there were more computations to bring up this year than last, and the drawing of a greater number of fair sheets was taken in hand.

Kheri.

28. The cost of the Kheri Survey was R5 per square mile. This very low figure is due to—(*a*) there being no charge made for supervision (the Working-Plans Officer having directed the work); and (*b*) the traversing having been previously done by the Revenue Survey Department: hence the figure simply represents the cost of the bare plane-tabling in an exceedingly flat and easy country.

New Reserves in Kumaun Division.

29. In the Central Circle of the North-Western Provinces, the plane-table boundary surveys cost R4 per linear mile; no cost rate can be given for the Gogar and Ninglat Forest Surveys, as the detailed topographical work was only commenced just before the close of the year.

Bashahr, Punjab.

30. The cost of the Bashahr Survey in the Himalayas, estimated on the area plane-tabled, is (for the year under report) R47 per square mile. This figure includes part of Mr. Reynolds' pay and allowances for supervision. The details included in the cost are—(*a*) triangulation, (*b*) computations, (*c*) plane-tabling of topographical details on the 4″ scale, with the measurement of levelled contours at vertical distances of 500 feet and sketched line at 25 feet intervals, (*d*) the preparation of the record of forest-growth, (*e*) fair map-drawing, and (*f*) supervision. The average cost per square mile of the triangulation from the commencement of survey in 1885 and up to date (including the computations) is R3, and the average cost of the plane-table or detailed survey spread over the same period is R22 per square mile. A detailed topographical map of the Bashahr Survey (sheet No. 346 $\frac{S.E.}{3}$ Punjab) is attached to this Report for reference (enclosure No. 5), and a second copy of the same sheet is also

added (enclosure No. 3), which shows the details of the "record of forest-growth" which is prepared for all forests under surveys, and by the same surveyors and at the same time as the topographical work is done, and at no additional cost.

Maps printed in colours.

31. It has frequently been remarked of late that if the hill sketching on forest maps was of a lighter shade, it would make the maps more useful for forest purposes. An endeavour has this year been made to carry out this idea by having the maps printed in two colours, *viz.*, all details, except the hills, being printed in black, whilst the hill shading (which is sometimes considered heavy) is printed in brown. Maps printed in colours are more expensive than maps in a *single* colour, but the usefulness of the former for forest purposes will fully compensate for the small additional outlay in printing. Sheet No. 333 $\frac{8 \text{ W.}}{1 \& 2}$ of the Bashahr series in the Punjab has been printed in colours, and is attached for reference (enclosure No. 6). A "skeleton" copy of the same sheet is also attached and marked No. 7.

An additional advantage in printing forest maps in this style is that, as the original drawing containing the hill shading is prepared on a separate sheet to the one on which the "skeleton" work is done, "skeleton" copies of maps can always be made available without going to the expense, as heretofore, of preparing fresh drawings.

Instruction of Students of the Forest School.

32. Of the 49 students who went through a practical course in Surveying with Mr. Copeland in the Kalesar Forests, 21 passed in Surveying before the close of last Survey year and received certificates, 22 of the same batch passed later on, between October 1886 and January 1887, and also received certificates, 2 failed, and 4 did not appear for examination owing to their having discontinued their work at the School.

During the cold weather of 1886, Dr. Warth was deputed to instruct the Forest Students in Surveying; the classes were held at Ramgarh in the Dehra Dun Forests, and 30 students went through the practical course. Of these one has already passed and obtained a certificate in Surveying, and the others are now undergoing their examination.

Thirty-four students of the first year attended the Drawing classes in the Survey Office during the School session of 1887. The instruction was given by Messrs. T. and J. Marten under the direction of Mr. Reynolds, and the hours of attendance were from 7 to 8½ A.M.

Examination of Candidates for Forest Appointments.

33. The Surveying papers of Mr. W. J. Ryan, a candidate for a Forest appointment in the Central Provinces, and of Mr. R. Delmerick, a candidate for an appointment in the Punjab, were examined by the Superintendent of Forest Surveys; the papers were up to the required standard, and certificates were accordingly awarded to the candidates as having qualified in Surveying by the Lower Standard, as prescribed in paragraph 52 (3rd edition) of the Forest Department Code.

Mr. W. H. Reynolds, Superintendent of Forest Surveys.

34. Mr. Reynolds, throughout the year, directed and controlled the entire field operations of the Forest Survey Branch in Berar, Bengal, the Punjab, and the North-Western Provinces and Oudh, as well as the head-quarters work at Dehra Dun. He was confirmed in the appointment of Superintendent of Forest Surveys, from 2nd February 1887,* in which appointment he had been officiating since 22nd February 1884. Mr. Reynolds

* *Vide* Government of India, Revenue and Agricultural Department, Notification No. 454 F., dated 27th May 1887.

was with the Bashahr party supervising the field work in the Himalayas from the 17th November to the middle of December; he then returned to Dehra and examined the Forest Students in Surveying; he met the Conservator of Forests, Central Circle, North-Western Provinces, at Hardwar, on the 10th January, to consult with him regarding the surveys that were in progress in his Circle; from the 19th January to 13th April, Mr. Reynolds was with the Berar party. When the season's work in the Melghát was well-advanced, Mr. Reynolds returned for a short time to his head-quarters office at Dehra, and again took the field with the Bashahr party and was engaged in supervising the survey of the Kotkhái and Kotgarh Forests in the Simla District during May and June; in July he returned to head-quarters.

Mr. E. F. Litchfield, Officiating Deputy Conservator of Forests.

35. Mr. Litchfield, Officiating Deputy Conservator of Forests, was employed throughout the field season in the Melghát. He took the field on the 26th November, after starting the several field parties from Chikalda, and returned to recess quarters on the 23rd June. He suffered a good deal from fever during the early part of the field season, which somewhat hampered his movements. He was left in charge of the Melghát field party from the 13th April to the close of the season. During the recess months Mr. Litchfield was left in charge of the Drawing Office at Chikalda, and was himself employed upon the fair drawing of the 2″ Melghát maps. Mr. Litchfield is a good field surveyor and an excellent draftsman.

Forest Surveyors.

Mr. G. P. Chill.

36. Mr. Chill was employed throughout the field season on plane-tabling. He left Chikalda on the 19th November, and commenced work in the Garga valley on the 23rd; he returned to recess quarters on the 21st June. During the recess months he has been employed upon the drawing of 4″ fair sheets of the Katkumb Pargana and part of the Garga valley. Mr. Chill's conduct whilst in camp, and left entirely to himself, has not been quite as satisfactory as it might have been; he is much too hasty with Natives.

Mr. T. S. Marten.

37. Mr. Thomas Marten was again employed throughout the field season on the forest boundary surveys in the Singhbhum District of Bengal; he left Dehra on the 4th November, arriving at Chyebassa on the 17th; he continued in the field until the 19th April, and returned to head-quarters on the 27th. During the recess months Mr. T. Marten was employed upon plotting and drawing the fair sheets of the Singhbhum Reserves; he also drew one of the fair sheets of Bashahr, and instructed a section of the Forest students in plan and map-drawing. Mr. Marten has worked steadily and well during the past year.

Mr. J. Marten.

38. Mr. James Marten started from Dehra on the 18th November, and arrived in the Melghát in Berar on the 25th; he commenced field work on the 28th. He was attached to the Melghát party throughout the season and worked in the Sipna valley and on the Tapti; he was in the field until the 26th June, and returned to Dehra to recess on the 1st July. This was Mr. Marten's first season in the Melghát, and consequently he suffered very much from fever; nevertheless he continued to work with a will, and under great difficulties managed to turn out a satisfactory season's work. During the recess months he was employed upon drawing the 4″ maps of the Melghát and upon other miscellaneous work. Mr. James Marten always works willingly, cheerfully, and well, and is in every way an excellent assistant.

39. Mr. Descules was appointed to the Survey Branch from 18th January 1887; he was employed at the Chilkalda Office in Berar in preparing charts of triangulation and other fair drawings up to the middle of April, and he was then brought up to Dehra and employed during the rest of the year in compiling special Provincial Forest Maps and in other miscellaneous office work. Mr. Descules is a very quick and neat draftsman.

Mr. A. Descules.

Sub-Surveyors.

40. The average strength of the Native establishment employed during the field season on each kind of work was:—

Triangulation		1
Traversing		5
Plotting, &c.		1
Computing		4
Plane-tabling		10
	In the field	21
At head-quarters		19
	Total	40

The Native establishment has on the whole worked well, and has turned out good and reliable work. Every branch of the work has been mastered by the Native assistants, and many of them have proved most trustworthy men.

Health of the Establishment.

41. The Survey parties employed both in Singhbhum (Bengal) and the Melghát in Berar suffered a good deal from fever. Three Native surveyors died, immediately after the close of the field season, from ailments which were contracted in the malarious tracts under survey, and several khalasis died during the working season.

Work done by the Survey of India for Forest Surveys.

42. The Superintendent of Forest Surveys has much pleasure in again acknowledging the advantages he has received owing to the courtesy and kindness of the Deputy Surveyor General of the Trigonometrical Survey Branch, in whose office the Forest Survey maps are photozincographed; and he also acknowledges the ready assistance he always receives from Mr. W. H. Cole, Deputy Superintendent, Survey of India, in matters connected with the printing and publishing of Forest Maps.

43. The following documents are appended to this Report, *viz.*:—

1. Index Map to the Forest Survey of Melghát Taluk, Berar, scale 1″=8 miles.
2. Index Map to the Forest Survey of Bashahr Punjab, scale 1″=4 miles.
3. Map of the Government Forests in the Bashahr State, Punjab, sheet No. 346 $\frac{S.E.}{3}$, scale 4″=1 mile, showing the record of forest-growth.
4. Map of the Melghát Taluk, District Ellichpur, Berar, sheet No. 20S.W. (Central Provinces), scale 2″=1 mile.
5. Map of the Government Forests in the Bashahr State, Punjab, sheet No. 346 $\frac{S.E.}{3}$, scale 4″=1 mile.

6. Map of the Government Forests in the District of Simla, part of Kotkhái, Punjab, sheet No. 333, parts of $\frac{S\,W}{1\,\&\,2}$, scale 4″=1 mile (shaded).
7. Map of the Government Forests in the District of Simla, part of Kotkhái, Punjab, sheet No. 333, parts of $\frac{S\,W}{1\,\&\,2}$, scale 4″=1 mile (skeleton).
8. Appendix A.—Summary of Outturn of field work and computations.
9. Appendix B.—Summary of Outturn of drawing and miscellaneous work.
10. Appendix C.—Summary of Expenditure from 1st October 1886 to 30th September 1887, showing the amounts expended on Field and Office Work (Imperial).
11. Appendix D.—Summary of Expenditure from 1st October 1886 to 30th September 1887, showing the amounts expended on Field and Office Work (Berar).
12. Annual Form No. 58.—Summary of Revenue and Expenditure (Imperial Surveys) during the Financial year.
13. Annual Form No. 58.—Summary of Revenue and Expenditure (Berar Surveys) during the Financial year.
14. Annual Form No. 59.—Account Current.
15. Annual Form No. 61.—Revenue received and Outstandings on account of Revenue.

W. H. REYNOLDS,

Superintendent of Forest Surveys.

APPENDIX A.

Summary of Outturn of Field Work and Computation by the Forest Survey Department, from 1st October 1886 to 30th September 1887.

No.	North-Western Provinces and Oudh, Bengal, Punjab, and Berar Surveys.		Amount.	Remarks.
	Plane-tabling.			
1	Area plane-tabled on the scale of 4″=1 mile—			
	(*a*) Kheri—Oudh	26·96		
	(*b*) Melghát—Berar	252·80		
	(*c*) Bashahr—Punjab	174·		
	(*d*) Singhbhum—Bengal	54·		
		507·76		
	Area plane-tabled on the scale of 2″=1 mile—		903·35	Square miles.
	(*a*) Kheri—Oudh	178·41		
	(*b*) Melghát—Berar	217·18		
		395·59		
2	On the scale of 4″=1 mile—			
	(*a*) New Reserves, Kumaun Division, Central Circle, North-Western Provinces—			
	Boundary	164·86		
	Roads	50·	646·86	Linear miles.
	(*b*) Singhbhum—Bengal—			
	Boundary	432·		
3	Area triangulated—			
	(*a*) Ninglat and Gogar, Central Circle, North-Western Provinces	70		
	(*b*) Melghát—Berar	265	580	Square miles.
	(*c*) Bashahr—Punjab	245		
4	Number of points fixed—			
	(*a*) Ninglat and Gogar, Central Circle, North-Western Provinces	140		
	(*b*) Melghát—Berar	703	1,115	
	(*c*) Bashahr—Punjab	272		
	Traversing.			
5	Area traversed—			
	(*a*) Melghát—Berar	53	453	Square miles.
	(*b*) Singhbhum—Bengal	400		
6	Number of linear miles traversed—			
	(*a*) Melghát—Berar	65·96	497·96	
	(*b*) Singhbhum—Bengal	432·		
7	Number of traversed stations—			
	(*a*) Melghát—Berar	342	6,482	
	(*b*) Singhbhum—Bengal	6,140		

No	North-Western Provinces and Oudh, Bengal, Punjab, and Berar Surveys		Amount	Remarks
	Contouring.			
8	Number of linear miles of measured contours—			
	(*a*) Melghát—Berar	846	2,399	
	(*b*) Bashahr—Punjab	1,553		
	Computations.			
9	Number of linear miles of traversing in duplicate—			
	(*a*) Melghát—Berar	53·96	454·96	
	(*b*) Singhbhum—Bengal . . .	401·		
10	Number of traverse stations computed in duplicate (rectangular co-ordinates)—			
	(*a*) Melghát—Berar	200	6,306	
	(*b*) Singhbhum—Bengal . . .	6,106		
11	Number of triangles worked in duplicate—			
	(*a*) Ninglat and Gogar, Central Circle, North-Western Provinces . .	270	1,678	
	(*b*) Melghát—Berar	917		
	(*c*) Bashahr—Punjab	491		
12	Number of points fixed thereby—			
	(*a*) Ninglat and Gogar, Central Circle, North-Western Provinces . .	123	692	
	(*b*) Melghát—Berar	317		
	(*c*) Bashahr—Punjab	252		
13	Number of triangles worked in duplicate to determine heights—			
	(*a*) Ninglat and Gogar, Central Circle, North-Western Provinces . .	232	1,410	
	(*b*) Melghát—Berar	700		
	(*c*) Bashahr—Punjab	478		
14	Number of points of which the heights were determined thereby—			
	(*a*) Ninglat and Gogar, Central Circle, North-Western Provinces . .	116	714	
	(*b*) Melghát—Berar	359		
	(*c*) Bashahr—Punjab	239		
15	Abstract of horizontal angles in duplicate—			
	(*a*) Ninglat and Gogar, Central Circle, North-Western Provinces . .	758	5,747	
	(*b*) Melghát—Berar	3,516		
	(*c*) Bashahr—Punjab	1,473		
16	Number of G.T. Survey stations computed in duplicate—			
	(*a*) Melghát—Berar	21	89	
	(*b*) Bashahr—Punjab	68		
17	Number of tangent scale clinometer observations—			
	(*a*) Melghát—Berar	2,535	3,534	
	(*b*) Bashahr—Punjab	999		

No.	North-Western Provinces and Oudh, Bengal, Punjab, and Berar Surveys.	Amount.	Remarks.
18	Number of heights determined by tangent scale clinometer—		
	(*a*) Melghát—Berar . . . . 1,340 (*b*) Bashahr—Punjab 386	1,726	
19	Number of demarcated fields the areas of which have been deduced	389	

APPENDIX B.

Summary of outturn of Drawing and Miscellaneous Works executed by the Forest Survey Department, from 1st October 1886 to 30th September 1887.

No.	Particulars.	No. of Sheets.
	ORIGINAL DRAWINGS.	
	North-Western Provinces and Oudh.	
1	Kumaun and Garhwal Sheets, scale 4″=1 mile, (in progress) Nos. III, VI, XI, and LXXV.	4
2	Kumaun and Garhwal Sheets, scale 2″=1 mile, Nos. I, IIIA, IIIB, IV, V, XV, XVII, XVIII, XIX, XX, XXI, XXII, XXIII, XXV, XXVI, XXVII, XXVIII, XXXI, XXXII, XXXIV, XXXV, XXXVI, XXXVII, XXXVIII (published).	24
3	Chart of Kumaun and Garhwal Triangulation, scale 1″= 1 mile, in progress Nos. I, IV, VI, and VIII. (Nos. I and IV sent to press).	4
4	Index Chart of field sheets of Kumaun and Garhwal Survey, scale 1″=4 miles (in progress).	1
5	Map of the Nindhaur Hills Working Circle, Ganges Division, Central Circle, showing the blocks, scale 1″= 1 mile (published).	1
6	Map of the Cantonment and Environs of Ranikhet, 1870-86, scale 6″= 1 mile (published).	1
7	Map of the Dehra Dun Reserved Forests, illustrating Working-Plan, scale 1″=4 miles (published).	1
8	Map of the Shaharanpur Division (in progress)	1
9	Geological Map of the Mussooree—Gangotri route, scale 6 miles =1″ .	1
10	Map of Puranpur Reserved Forests, District Pilibhit, Oudh, scale 1″= 1 mile (published).	1
11	Maps of Kheri District, Oudh, Sheets Nos. 113 N.W. and 113 S.W., scale 2″=1 mile (in progress).	2
	Punjab.	
12	Map of the Kalesar Reserved Forest, in the District of Umballa, part of Sheet No. 336, scale 4″=1 mile (published).	1
13	Map of the Government Forests in the Bashahr State, Punjab, Sheet No. 346 $\frac{S.E.}{3}$, scale 4″=1 mile (published).	1
14	Map of the Government Forests in the District of Simla, Punjab, Sheet No. 333 parts of $\frac{S.W.}{1\&2}$, scale 4″=1 mile, skeleton (published).	1
15	Map of the Government Forests in the District of Simla, Punjab, Sheet No. 333, parts of $\frac{S.W.}{1\&2}$, scale 4″=1 mile, shaded (published).	1

No.	Particulars.	No. of sheet.
16	Map of the Government Forests in the District of Simla, Punjab, Sheet No. 333, parts of $\frac{N.\ W.}{1\ \&\ 2}$, skeleton (sent to press).	1
17	Map of the Government Forests in the District of Simla, Punjab, Sheet No. 333, parts of $\frac{N.\ W}{1\ \&\ 2}$, shaded (sent to press).	1
18	Map of the Government Forests in the District of Simla, Punjab, Sheet No. 332, parts of $\frac{S\ W.}{3}$ (in progress).	1
19	Map of Changa Manga plantation, to illustrate the Working-Plan, 1886, scale 4″=1 mile (published).	1
20	Maps of Chamba Forests, scale 2″=1 mile, Nos. 1 to 7 (in progress).	7
21	Map of the Kangra District, in two sheets, scale 1″=2 miles (in progress).	1
	Bengal.	
22	Maps of the Government Forests in the Chota Nagpur Division, Singhbhum, scale 4″=1 mile, Sheets Nos. 126 $\frac{S.\ E.}{3}$, 126 $\frac{S\ E}{4}$, 127 $\frac{N.\ E}{1}$, 127 $\frac{N.\ E.}{2}$, 127 $\frac{N.\ E}{3}$, 127 $\frac{N.\ E.}{4}$, 127 $\frac{S.\ E.}{2}$, 157 $\frac{S.\ W.}{3}$, 158 $\frac{N\ W.}{1}$, 158 $\frac{N.\ W.}{3}$, 158 $\frac{S.\ W.}{1}$, and 158 $\frac{S.\ W.}{2}$, in progress (Sheets Nos. 127 $\frac{N.\ E.}{2}$, 157 $\frac{S.\ W.}{3}$, and 158 $\frac{N\ W.}{1}$, sent to press).	12
23	Map of the Government Forests in the Chota Nagpur Division, Singhbhum, scale 4″=1 mile, Sheet No. 157 $\frac{S.\ W.}{4}$ (published).	1
	Berar.	
24	Map containing the villages of Badnapur, Bhopapur, Deogaon, Gowlkhera, &c., part of Sheet No. 20 (Central Provinces), scale 4″ =1 mile (published).	1
25	Map containing the villages of Bhilkhera, Janona and Raipur, part of Sheets No. 20 and 20A. (Central Provinces), scale 4″=1 mile (published).	1
26	Map containing the villages of Borala, Gond-Waghali, Nandadari, Opadkhera, and Thapjhira, part of Sheet No. 20 (Central Provinces) (published).	1
27	Maps of the Melghát Taluk, District Ellichpur, Sheets Nos. 19 $\frac{N.\ E.}{1}$, 19 $\frac{N.\ W.}{1}$, 19 $\frac{N.\ E.}{2}$, 19 $\frac{N.\ W.}{2}$, 20 $\frac{N.\ W.}{2}$, 26 $\frac{N.\ W}{1}$, 26 $\frac{N.\ W.}{3}$, 26 $\frac{S.\ W.}{1}$, 26 $\frac{S\ W.}{3}$, and 26 $\frac{S\ W.}{4}$, scale 4″=1 mile (in progress).	10
28	Maps of the Melghát Taluk, District Ellichpur, Sheets Nos. 20 N. E., 20 N. W., 20 *a*. N. E., scale 2″=1 mile (in progress).	3
29	Maps of the Melghát Taluk, District Ellichpur, Sheets Nos. 20 S.W., 20 S. E., and 27 $\frac{N.\ W.}{S.\ W.}$, scale 2″= 1 mile (published).	3
30	Charts of Melghát Taluk Triangulation, Nos. 12, 19, 20, 20 A, 26, and 27, scale 1″=1 mile (in progress).	6
	Tracings made.	
31	Tracings made for various Forest and District Officers . . .	61
	Map colouring.	
32	Printed maps of various kinds coloured	3,158
	Mounted Maps.	
33	Printed maps mounted in book form	379

APPENDIX C.

Summary of Expenditure from 1st October 1886 to 30th September 1887, showing the amount expended on Field and Office Work of the Forest Surveys (Imperial).

No.	Months.	North-Western Provinces and Oudh.			Bengal.		Punjab.			General.	Total.	Remarks.
		Kumaun and Garhwal.		Kheri.	Singhbhum.		Bashahr.		Kalesar.			
		Field.	Office.	Field.	Field.	Office.	Field.	Office.	Office.			
		₹	₹	₹	₹	₹	₹	₹	₹	₹	₹	
1	October 1886	...	...	...	...	283	600	...	150	1 998	3,031	
2	November ,,	...	26	...	...	303	719	...	200	2,125	3,373	
3	December ,,	...	79	25	789	30	715	497	...	674	2,809	
4	January 1887	15	106	25	610	16	581	660	...	461	2,474	
5	February ,,	15	75	25	569	47	99	...	...	885	1,715	
6	March ,,	15	84	99	578	22	...	30	...	1,083	1,911	
7	April ,,	163	87	25	595	21	...	30	...	2,321	3,242	
8	May ,,	215	126	635	899	16	...	292	...	1,368	3,551	
9	June ,,	223	75	...	...	280	505	605	...	1,137	2,825	
10	July ,,	336	44	...	...	271	491	618	...	997	2,757	
11	August ,,	50	274	...	...	192	712	130	...	844	2,202	
12	September ,,	31	230	...	...	170	616	361	...	777	2,175	
	Total	1,063	1,196	834	4,040	1,651	5,038	3,223	350	14,670	32,065	

APPENDIX D.

Summary of Expenditure from 1st October 1886 to 30th September 1887, showing the amounts expended on Field and Office Work of the Forest Surveys (Berar).

No.	Months.	Field.	Office.	General.	Total.	Remarks.
		₹	₹	₹	₹	
1	October 1886	...	259	1,902	2,161	
2	November ,,	...	249	1,791	2,040	
3	December ,,	294	1,028	1,516	2,838	
4	January 1887	1,402	124	989	2,515	
5	February ,,	4,944	116	3,047	8,107	
6	March ,,	3,803	138	1,756	5,697	
7	April ,,	3,191	125	558	3,874	
8	May ,,	2,762	79	300	3,141	
9	June ,,	2,859	...	700	3,559	
10	July ,,	2,275	211	1,288	3,774	
11	August ,,	...	1,588	443	2,031	
12	September ,,	62	1,418	2,141	3,621	
	Total	21,592	5,335	16,431	43,358	

FORM No. 58.

Summary of Revenue and Expenditure of the Forest Survey Branch during 1886-87.

Receipts.

	₹	a.	p.
I.—Timber and other Produce removed from the Forests by Government agency :—			
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Sandalwood	...		
e. Grass and other minor produce	...		
II.—Timber and other Produce removed from the Forests by Consumers or Purchasers :—			
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Grazing and Fodder Grass	...		
e. Other minor produce	...		
III.—Confiscated drift and waif Wood			
IV.—Revenue from Forests not managed by Government :—			
a. Duty on Foreign Timber and other Forest Produce	...		
b. Revenue from Shared and Private Forests	...		
V.—Miscellaneous :—			
a. Fines and Forfeitures	...		
b. Refunds	27	14	1
c. Other sources	213	8	6
Total Receipts	241	6	7

Charges.

A.—Conservancy and Works.

I.—Timber and other Produce removed from the Forests by Government agency :—			
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Sandalwood	...		
e. Grass and other minor produce	...		
II.—Timber and other Produce removed from the Forests by Consumers or Purchasers	...		
III.—Confiscated drift and waif Wood	...		
IV.—Revenue from Forests not managed by Government :—			
a. Duty on Foreign Timber and other Forest Produce	...		
b. Revenue from Shared and Private Forests	...		
V.—Rent of Leased Forests, and Payments to Shareholders in Forests managed by Government	...		
VI.—Live-Stock, Stores, Tools and Plant :—			
a. Purchase of Cattle	...		
b. Feed and keep of Cattle	514	8	1
c. Stores, Tools and Plant	1,464	14	0
VII.—Communications and Buildings :—			
a. Roads and Bridges	...		
b. Buildings	...		
c. Other works	...		
Carried forward	1,979	6	1

FORM No. 58—*continued.*

Summary of Revenue and Expenditure of the Forest Survey Branch during 1886-87—concluded.

Charges—*concluded.*

A—CONSERVANCY AND WORKS—*concluded.*

	₹	a.	p.
Brought forward	1,979	6	1
VIII.—Demarcation, Improvement, and Extension of Forests :—			
a. Demarcation	...		
b. Compensation for Land and Rights	...		
c. Surveys and Working-Plans	5,575	14	8
d. Plantations	...		
e. Protection from Fire	...		
f. Other works	...		
IX.—Miscellaneous :—			
a. Refunds	...		
b. Law Charges	...		
c. Other charges	...		
TOTAL, A.—CONSERVANCY AND WORKS	7,555	4	9

B.—ESTABLISHMENTS.

I.—Salaries :—			
a. Conservators	...		
b. Superior Officers	3,600	0	0
$\frac{c}{1}$. Upper Subordinate Forest and Depôt Establishments	4,360	0	0
$\frac{c}{2}$. Lower Subordinate Forest and Depôt Establishments	4,791	15	4
d. Office Establishments	...		
e. Deputation and Special Allowances	...		
II.—Travelling Allowances :—			
a. Conservators	...		
b. Superior Officers	1,071	11	0
$\frac{c}{1}$. Upper Subordinate Forest and Depôt Establishments	870	8	0
$\frac{c}{2}$. Lower Subordinate Forest and Depôt Establishments	1,937	4	2
d. Office Establishments	...		
III.—Contingencies :—			
a. Stationery	6	14	0
b. Carriage of Tents and Records	455	4	3
c. Rents, Rates, and Taxes	...		
d. Pay of Police Guards	...		
e. Official Postage	462	1	0
f. Sundries	3,237	3	0
TOTAL, B.—ESTABLISHMENTS	20,792	12	9
Grand Total of Charges	28,348	1	6

Summary of Revenue and Expenditure of the Berar Forest Survey Branch during 1886-87.

Receipts.

I.—Timber and other Produce removed from the Forests by Government agency :—

	₹	a.	p.
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Sandalwood	...		
e. Grass and other minor produce	...		
Carried forward	...		

FORM No. 58—*continued.*

Summary of Revenue and Expenditure of the Berar Forest Survey Branch during 1886-87 —continued.

Receipts—*concluded.*

	R	a.	p.
Brought forward .	...		
II.—Timber and other Produce removed from the Forests by Consumers or Purchasers :—			
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Grazing and Fodder Grass	...		
e. Other minor produce	...		
III—Confiscated drift and waif Wood	...		
IV.—Revenue from Forests not managed by Government :—			
a. Duty on Foreign Timber and other Forest Produce . . .	...		
b. Revenue from Shared and Private Forests	...		
V.—Miscellaneous :—			
a. Fines and Forfeitures	...		
b Refunds	19	0	0
c. Other sources	632	0	0
Total Receipts .	651	0	0

Charges.

A.—Conservancy and Works.

I.—Timber and other Produce removed from the Forests by Government agency :—			
a. Timber	...		
b. Firewood and Charcoal	...		
c. Bamboos	...		
d. Sandalwood	...		
e. Grass and other minor produce	...		
II.—Timber and other Produce removed from the Forests by Consumers or Purchasers	...		
III.—Confiscated drift and waif Wood	...		
IV.—Revenue from Forests not managed by Government :—			
a. Duty on Foreign Timber and other Forest Produce . . .	...		
b. Revenue from Shared and Private Forests	...		
V.—Rent of Leased Forests, and Payments to Shareholders in Forests managed by Government			
VI.—Live-Stock, Stores, Tools and Plant :—			
a. Purchase of Cattle	...		
b. Feed and keep of Cattle	1,274	3	0
c. Stores, Tools and Plant	1,428	6	10
Carried forward .	2,702	9	10

FORM No. 58—*concluded.*

Summary of Revenue and Expenditure of the Berar Forest Survey Branch during 1886-87 —concluded.

Charges—*concluded.*

A.—Conservancy and Works—*concluded.*

		₹	a.	p.
	Brought forward	2,702	9	10
VII.—Communications and Buildings:—				
a.	Roads and Bridges	...		
b.	Buildings	409	10	3
c.	Other works	...		
VIII.—Demarcation, Improvement, and Extension of Forests:—				
a.	Demarcation	...		
b.	Compensation for Land and Rights	...		
c.	Surveys and Working-Plans	7,160	11	3
d.	Plantations	...		
e.	Protection from Fire	...		
f.	Other works	...		
IX.—Miscellaneous:—				
a.	Refunds	...		
b.	Law Charges	...		
c.	Other charges	15	6	0
	Total, A.—Conservancy and Works	10,288	5	4

B.—Establishments.

I.—Salaries:—				
a.	Conservators	...		
b.	Superior Officers	14,602	4	1
c.	Upper Subordinate Forest and Depôt Establishments	3,800	0	0
c.	Lower Subordinate Forest Establishments	6,263	9	7
d.	Deputation and Special Allowances	...		
II.—Travelling Allowances:—				
a.	Conservators	...		
b.	Superior Officers	3,773	13	6
c.	Upper Subordinate Forest and Depôt Establishments	1,336	3	0
c.	Lower Subordinate Forest Establishments	2,833	2	4
III.—Contingencies:—				
a.	Stationery	4	2	0
b.	Carriage of Tents and Records	352	4	0
c.	Rents, Rates, and Taxes	1,000	0	0
d.	Pay of Police Guards	...		
e.	Official Postage	84	8	6
f.	Sundries	1,133	8	10
	Total, B.—Establishments	35,183	7	10
	Grand Total of Charges	45,471	13	2

FORM No. 59.

Account Current of the Forest Survey Branch for the year 1886-87.

Dr.				Cr.			
	₹ a. p.	₹ a. p.			₹ a. p.	₹ a. p.	
Opening balance . .	...	247 13 9		By 11 Forest—Expenditure as per Form No. 58 . .		28,348 1 6	
To VIII Assessed Taxes, Income Tax deductions from salary bills .	.	744 0 4					
To IX Forests, Revenue as per Form No. 58 . .		241 6 7					
Service Funds. To Uncovenanted Service Family Pension Fund .		926 11 0					
Forest Cash Remittances (local)— To Forest Cheques drawn .	...	1,205 15 4					
Advances Recoverable .	...	11,788 12 2		By Advances Recoverable .		11,725 8 8	
Suspense . . .	...	26 10 9		By Suspense . . .		26 10	
Account Current—Other Governments.				Account Current—Other Governments.			
To Government, N.-W. P. and Oudh .	32,309 15 1	...		By Government, North-Western Provinces and Oudh . .	...	75 7 0	
,, ,, Bengal .	3,217 2 4	...					
,, ,, Punjab .	4,563 15 7	40,091 1 0					
Inter-Departmental Transfers.				Inter-Departmental Transfers.			
Civil Departments.				*Civil Departments.*			
To Mathematical Instrument Department . . .	1,146 4 0			By Mathematical Instrument Department .	210 8 6		
To Survey of India Department	2,445 12 0	...					
Berar Suspense Account.							
	₹ a. p						
To Melghát Survey Revenue	651 0 0	.		Berar Suspense Account.			
To Ellichpur Forest Division .	17413 0	.		By Expenditure on Melghát Survey .	₹ a p 45,471 13 2		
To Remittance from Chikalda Treasury .	13,898 0 10	...	...	By Remittance to Chikalda Treasury .	630 0 0		
To Remittance from Ellichpur Treasury .	11,802 9 2	...	...			46,101 13 2	46,312 5 8
To Remittance from Amraoti Treasury .	1,097 3 8	...	...	By Closing balance . .			.
		27,623 10 8	31,215 10 8				
Total .			86,488 1 7	Total .	...		86,488 1 7

FORM No. 61.

Outstanding and Liabilities on account of Contractors and Disbursers for 1886-87.

Division.	Department Debtor.			Department Creditor.			Balance Due	
	At commencement of year.	Recoveries in cash and value of supplies and work done during year.	At close of year.	At commencement of year.	Payments made during year.	At close of year.	To Department (Outstandings).	By Department (Liabilities).
		₹ a. p.	₹ a. p.	₹ a. p	₹ a p	₹ a. p	₹ a. p.	
Forest Surveys .	...	11,788 12 2	11,788 12 2	1,085 8 2	11,725 8 8	12,811 0 10	1,022 4 8	
Total .	...	11,788 12 2	11,788 12 2	1,085 8 2	11,725 8 8	12,811 0 10	1,022 4 8	

Government of India Central Printing Office.—No. 774 R & A.—28-3-88 —285.